

AMENDMENTS TO THE CLAIMS

Claim 1. (Previously Presented)

A solid-state image pickup apparatus comprising:

an image pickup section; and

a signal feeding section;

said image pickup section comprising:

photosensitive cells for photoelectrically transducing incident light representative of a scene, said photosensitive cells being arranged bidimensionally in such position that each of said photosensitive cells is shifted in position from adjoining ones of said photosensitive cells in a horizontal and a vertical direction;

a color filter having R (red), G (green) and B (blue) color filter segments for separating colors of the incident light, each of the color filter segments being positioned in front of a particular one of said photosensitive cells in a direction of the incident light and being arranged in a vertical stripe pattern in which the segments of a same color form a column in the vertical direction;

first transfer electrodes, each being assigned to a particular one of said photosensitive cells, for reading out a signal charge generated by said particular photosensitive cell, second transfer electrodes assigned to vertical transfer paths, and third transfer electrodes assigned to a horizontal transfer path substantially perpendicular to the vertical transfer paths for forming at least one vacant packet between packets holding the signal charges transferred from said vertical transfer paths; and

control circuitry for sequentially performing preliminary pickup and actual pickup, which reads all of the signal charges out of said photosensitive cells, and executing digital signal processing with signals resultant from the signal charges read out;

second signal feeding section feeding transfer timing signals for transferring the signal charges generated by ones of said photosensitive cells which are positioned on odd or even-numbered ones of the columns to the vertical transfer paths via said first transfer electrodes associated with said photosensitive cells on odd-or even-numbered lines, vertical drive signals for transferring the signal charges along said vertical transfer paths toward said horizontal transfer path, and horizontal drive signals adjusted in timing for transferring the signal charges along said horizontal transfer path while maintaining a color of the signal charges.

Claim 2. (Original)

An apparatus in accordance with claim 1, wherein in the event of the preliminary pickup said signal feeding section output said horizontal drive signals such that a well is formed in each packet of said horizontal transfer path adjoining a packet storing the individual signal charge at the same time as a well formed in said packet storing said individual signal charge.

Claim 3. (Original)

An apparatus in accordance with claim 1, wherein said signal feeding section outputs said horizontal drive signals such that a range of said horizontal transfer path driven in a same phase and derived from an electrode structure of said horizontal transfer path is doubled.

Claim 4. (Original)

An apparatus in accordance with claim 3, wherein when said horizontal transfer path has a four electrode structure, said signal feeding section outputs said horizontal drive signals such that two phases are combined into a single phase.

Claim 5. (Currently Amended)

A method of reading signal charges generated by photosensitive cells, which are arranged bidimensionally in such positions that each of said photosensitive cells is shifted in position from adjoining ones of said photosensitive cells in a horizontal and a vertical direction for photoelectrically transducing incident light of particular separated color representative of a scene, in a particular manner for preliminary pickup and actual pickup, which reads all of the signal charges out of said photosensitive cells for recording the signal charges, said method comprising the steps of:

(a) positioning in front of said photosensitive cells in a direction of the incident light a color filter, which has color filter segments of three primary colors R, G and B each for separating colors of the incident light and arranged in a vertical stripe pattern in which the segments of same color form a column in the vertical direction, and forming transfer electrodes, each of which is assigned to a particular one of the photosensitive cells for reading out a signal charge generated by said particular photosensitive cell, said transfer electrodes respectively contacting said photosensitive cells;

(b) generating drive signals for reading out the signal charges generated by said photosensitive cells and representative of an image picked up;

(c) rendering conductive, during the preliminary pickup, the transfer electrodes associated with ones of the photosensitive cells which are positioned on odd or even-numbered lines in response to the drive signals to reduce pixels in the horizontal direction by vertical thinning, where each of said photosensitive cells is shifted in position from adjoining ones of said photosensitive cells in a horizontal and a vertical direction;

(d) transferring the signal charges read out in said step (c) in the vertical direction in response to the drive signals; and

(e) transferring the signal charges having transferred in said step (d) in the horizontal direction perpendicular to said vertical direction with a timing of the drive signals being adjusted.

Claim 6. (Original)

A method in accordance with claim 5, wherein said step (b) comprises the step (f) of generating, in the event of the preliminary pickup, horizontal drive signals such that a well is formed in each packet horizontally adjoining a packet storing an individual signal charge at the same time as a well formed in said packet storing said individual signal charge.

Claim 7. (Original)

A method in accordance with claim 5, wherein said step (e) comprises the step (g) of generating said drive signals such that a range of a same phase is doubled in the horizontal direction.

Claim 8. (Previously Presented)

A method in accordance with claim 7, wherein, when four-phase drive signals are used for usual horizontal transfer, said step (e) comprises the step (h) of generating said drive signals such that two phases are combined into a single phase.